

Sibutu I., *Oriolus chinensis* and *Sarcops calvus*, the latter at least is purely Philippine, I cannot help thinking that a more extended knowledge of its avifauna would probably show a preponderance of western rather than eastern species."

In concluding this sketch of the grounds upon which I am induced to consider Palawan and the other islands above mentioned as component parts, from a zoo-geographical point of view, of the Bornean group, I may mention that I hope to be able to obtain a small collection from the mountains of Palawan before long, and also one from Sibutu.

2. On the Mammals of Mount Kina Balu, North Borneo.

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(Plate XXIV.)

The Mammals described in the present paper formed part of the large zoological collections made during 1887 and 1888 on the great mountain Kina Balu in North Borneo by Mr. John Whitehead, a gentleman who, although primarily an ornithologist, yet wisely collected whatever Mammals he was able to obtain in that most interesting and as yet unknown part of the island.

The species of which specimens were obtained number 21. Of these 6 were new to science, and 5 more were new to Borneo, thus increasing the known Mammal fauna of the island by no less than 11. The large number of new species is a most remarkable fact, and one that shows how far we still are from anything like a complete knowledge of the smaller Mammalia and their distribution; and this is especially the case with the Rodents, to which, as usual in such cases, the majority of the new forms belong.

Until more is known of the mammals inhabiting the other mountains of Borneo, it is not possible to draw any general geographical deductions from the present collection; but it may be noted that, of the additions to the Bornean fauna, one species was previously only known from the Himalayan region, where also is found the nearest ally of one of the new species, two are Sumatran, one is Javan, and one occurs in Celebes.

1. SEMNOPITHECUS HOSEI, Thos. P. Z. S. 1889, p. 159, pl. xvi.

a. Skull, 4000 feet.

The only other locality known for this species is Baram, on the coast at the junction of Brunei and Sarawak, where the type specimen was obtained by Mr. Charles Hose. The present skull is that mentioned in the original description (*supra*, p. 159).





2. *CYNOPTERUS ECAUDATUS*, Temm.

a. 3000 feet. 29/3/88.

Previously only known from Sumatra. This species may be readily distinguished from the somewhat similar *C. lucasi*, Dobs.¹, by its rather smaller size, by not possessing any trace of a tail, and by the attachment of its wing-membrane to the distal third of the first phalanx of the hallux instead of to its base.

3. *TUPAIA FERRUGINEA*, Raffl.

a-b. 3000 feet. 3/87.

c. 8000 feet. 5/2/88.

4. *HYLOMYS SUILLUS DORSALIS*, Thos. Ann. Mag. N. H. (6) ii. p. 407 (1888).a. ♂. 8000 feet. 2/88. *Type* of var.

b. ♂. 8000 feet. 9/2/88.

c. 3000 feet. 21/3/88.

Essential characters as in the typical variety, but with a more or less distinct black line running from between the eyes down the neck to the middle of the back.

Dimensions:—Head and body (c.) 116 millim.; tail 16; hind foot 25.

Since all the five or six specimens of *Hylomys* obtained on Kina Balu show a black dorsal line, sometimes, it is true, faint and indistinct, but always present, I believe this to be a valid geographical race, characteristic at least of Mount Kina Balu, if not of the whole of Borneo, whence, up to the present, no other specimens have been obtained. It should be stated, however, that Dr. F. A. Jentink, of the Leyden Museum, where the type of *H. suillus* is preserved, believes it to be not worthy of separation from that animal; but as he is inclined to give, in certain other allied groups, rather less importance to the presence or absence of a dorsal streak than appears to me correct, I do not as yet feel disposed definitely to withdraw the merely varietal name already given to the Kina Balu *Hylomys*.

The true *Hylomys suillus* has been recorded from Burma, the Malay Peninsula, Sumatra, and Java.

5. *CHINARROGALE HIMALAYICA*, Gray.

a. Ad. sk.

The occurrence of this fine Water-Shrew on Mount Kina Balu is a most interesting fact, and affords a remarkable instance of the relation that the fauna of the mountainous regions of the Malay islands bears to that of the Himalayas. The species has previously only been recorded from Sikhim, Assam, and the Katchin Hills in the North of Burma. The Bornean specimen is rather smaller than the type, its hind foot measuring only 20 millim. in length as against 22.5, but is otherwise identical; this difference in size is very probably only sexual.

¹ Ann. Mag. N. H. (5) vi. p. 163 (1880).

6. *CROCIDURA* (*CROCIDURA*), sp. inc.

a-c. 1000 feet. 1887 and 1888.

In the present state of our knowledge I am unable to name these Shrews with certainty. They are allied to, but markedly larger than, *C. fuliginosa*, Blyth.

7. *PTEROMYS* *NITIDUS*, Desm.

a. Very young. 3000 feet. 4/88.

8. *SCIURUS* *BICOLOR* *EPHIPPIUM*, Temm.

a. ♀. 3000 feet. 14/3/88.

9. *SCIURUS* *PREVOSTII*, Desm.

a, b. 1000 feet. March, 1887.

c, d. 1000 feet. 1888.

a, b, and *c* are of the grey-backed form of this species, and *d* of the black form, "*S. pluto*, Gray."

10. *SCIURUS* *JENTINKI*, Thos. Ann. Mag. N. H. (5) xx. p. 129 (1887).

a. ♀. 3000 feet. 14/2/87. *Type.*

b. 3000 feet. 14/2/87.

Native name "Tigae."

Size about equal to that of *S. tenuis*, Horsf. General colour of upper surface yellowish grey, strongly suffused with orange on the head and along the centre of the back. Hairs dark slaty grey for four fifths of their length, their tips yellow or orange. Face grey, but with a white rim round each eye. Ears extremely short, rounded, their edges white or pale yellow, and standing out in marked contrast against a patch of wholly black hairs situated just behind them on the sides of the neck. Hairs of chin, chest, and belly slaty grey basally, dull yellowish white distally; line of demarcation on sides quite gradual. Limbs coloured as in *S. tenuis*; hind soles hairy for their proximal 8 millim. Tail slender, the hairs being comparatively short, only about 10 or 12 millim. in length; these hairs are broadly ringed with orange basally, and have a black subterminal and a white terminal band.

Incisors dark yellow above and below; premolars $\frac{2}{1}$; molars rather smaller and lighter than those of *S. tenuis*.

Dimensions of specimen *a*, a female, preserved in skin:—

Head and body 140 millim.; tail, without hairs 103, with hairs 136; hind foot 32.5; ear, above crown 4.0.

Skull: tip of nasals to bregma 25; greatest breadth 20; length of nasals 9.5; interorbital breadth 11.8; palate, length 16.6; length of upper tooth series 6.4.

This species is most nearly allied to *S. tenuis*, Horsf., which ranges from the Malay Peninsula to Borneo, and of which there are a large number of examples in the Natural History Museum. It differs, however, in its much paler orange-washed back, shorter and more

prominently white-rimmed ears, the dark patches behind the latter, and in its less bushy tail. It is also worthy of note that although *S. tenuis*, throughout its range, is singularly uniform in coloration, yet, if anything, the Bornean specimens of it are darker in colour, and are therefore still less like *S. jentinki* than are those from the Malay Peninsula, a fact which shows that the two species have no tendency to grade into one another.

I have named this species in honour of my friend Dr. F. A. Jentink, Director of the Leyden Museum, to whose labours we are indebted for much of our knowledge of the mammals inhabiting the East-Indian Archipelago.

Mr. Whitehead informs me that *S. jentinki* ranges on Mount Kina Balu from about 3000 to 8000 feet altitude.

11. *SCIURUS NOTATUS*, Bodd. Elench. Anim. p. 119 (1785).

S. badjing, Kerr, Linn. An. K. p. 262 (1792).

S. plantani, Ljung. K. Vet.-Ak. Handl. xxii. p. 99 (1801).

a, *b*. ad. ♀ and imm. 3000 feet. 28/3/88.

This common species, the Plantain Squirrel of Pennant, is represented by two specimens of the blue-bellied type, without any trace of red or yellow on their undersides.

At the cost of another change of name, I am glad to be able now to supersede the barbarous term "*S. badjing*," which I was guilty of resuscitating on account of its priority over the commonly used "*S. plantani*." An examination of Boddaert's rare work proves, however, that the Plantain Squirrel had already received a Latin name there, and one also that is fortunately both classical and appropriate.

12. *SCIURUS WHITEHEADI*, Thos. Ann. Mag. N. H. (5) xx. p. 127 (1887). (Plate XXIV.)

a. 3000 feet. 24/2/87. *Type*.

b. 3000 feet. 28/2/87.

c. ♂, in spirit.

Native name "Mantok."

Size very small, only slightly larger than that of *S. exilis*, Müll. Ears narrow, pointed, their tips provided with beautiful black and white pencils of hair, so long as to reach, when laid backwards, almost to the withers; the ears themselves edged with black, and with a marked white spot on the head behind them. Colour otherwise uniformly finely grizzled olive-grey all over, exactly as in *S. exilis* and *S. concinnus*. Claws both before and behind long, very sharp and much curved, so as to enable the animal to hang on to almost, or quite, vertical surfaces. Palms with five large pads. Soles with four subequal digital pads, and a small circular posterior pad; back of sole hairy for about 9 or 10 millim.

Skull very peculiarly shaped, with a short and broad cranial, and a disproportionally long and powerful facial portion, the distance from the tip of the nasals to a point between the anterior edges of the orbits 12·8 millim., as compared to 11·3 in *S. exilis*, and 11

millim. in *S. melanotis*, the latter an animal with the cranial part of the skull as large as, if not larger than, that of *S. whiteheadi*.

Teeth:—incisors narrow, strongly convex in front, orange above, nearly white below; premolars $\frac{2}{1}$, the anterior upper minute, circular in section.

Dimensions of specimen c, an adult male in spirit:—Head and body 84 millim.; tail, without hairs 67, with hairs 98; hind foot 25·7; ear, without hairs 10·0, with hairs 26; head 29·3; tip of muzzle to eye 18, to ear 24; forearm and hand 36·5; heel to front of last foot-pad 12·3; hairy part of sole in centre line 9·4.

This very beautiful little Squirrel is perhaps the most attractive of all the new Kina Balu mammals. It belongs to a group of pigmy squirrels, consisting of *S. exilis*, *S. melanotis*, and a species only recently described by myself, namely *S. concinnus*; the latter species comes from the Philippines, but the other two, like *S. whiteheadi*, both occur in Borneo, which possesses therefore three of the four members of the group. Of these species, *S. whiteheadi* is evidently most nearly allied to *S. exilis*, but it is readily distinguishable from that, as from all the others, by its beautiful elongated ear-tufts, which, in proportion to its size, are probably longer than those of any other known Squirrel, not even excepting *Rheithrosciurus macrotis*.

Mr. Whitehead informs me that this little Squirrel may often be seen on the upper slopes of Kina Balu running up and down the trunks of the trees, and apparently gnawing at their bark. Its position in the figure (Plate XXIV.) is copied from a sketch made by Mr. Whitehead from the living animal.

13. *MUS INFRALUTEUS*, Thos. Ann. Mag. N. H. (6) ii. p. 409 (1888).

a. 3000 feet. 22/3/88. *Type*.

Size large. Fur coarse and harsh, but not spinous. General colour dark greyish brown, the tips of the shorter hairs with a silvery lustre. The longer straighter hairs numerous, not markedly lengthened on the rump, uniformly black. Under surface a dirty yellowish brown, the tips of the straighter hairs dull orange, their base and the whole of the under-fur slaty grey. Ears small and rounded, naked. Hands and feet brown; last hind foot-pad elongate. Tail rather shorter than the head and body, thinly haired, dark brown above and below; rings of scales averaging about 8 or 9 to the centimetre. Skull stout and heavily built. Supraorbital edges strongly ridged. Anterior edge of outer wall of infraorbital foramen evenly convex forwards. Palatine foramen about equal in length to the two anterior molars together, not reaching backwards to the front of m^1 .

Teeth powerful; incisors broad, dark yellow in front above and below.

Dimensions:—Head and body (c.) 285 millim.; tail (extreme tip wanting) 235; hind foot 51; heel to front of last foot-pad 26; length of the same pad 9·3.

Skull : tip of nasals to lambda 51; nasals, length 21·8, breadth 6·5; interorbital breadth 8·8; infraorbital foramen, length of outer wall 7; palate, length 32; diastema 16·7; anterior palatine foramen 8·4; combined breadth of upper incisors 4·6; length of upper molar series 10·7.

This fine Rat has a certain similarity to the Indian Bandicoot Rats (*Nesokia*), resembling them both in general external appearance and in the stout and heavy build of the skull and teeth. No species hitherto described can be mistaken for it, as all the Oriental Rats which have external or cranial proportions at all similar are distinguished either by having elongated rump-bristles or parti-coloured white-tipped tails.

The single specimen obtained was found lying dead in the forest.

14. *MUS RATTUS*, L.

a, b. 8000 feet. 4 and 5/2/88.

c, d. 3000 feet. 1/4/88.

The two specimens from an altitude of 8000 feet have their fur long and soft, while in those from 3000 it is short and harsh, so that it seems difficult to believe that both the forms can be referable to the same species.

15. *MUS SABANUS*¹, Thos. Ann. Mag. N. H. (5) xx. p. 269 (1887).

a. 1000 feet. 3/87. *Type.*

b. (?) juv. 3000 feet. 21/3/88.

Fur short and fine, mixed with slender spines along the centre of the back. General colour rufous, mixed with brown along the top of the head and back, brighter and clearer on the cheeks and sides, the general tone very similar to that of *M. jerdoni*. Whole of underside pure creamy white, sharply defined from the rufous of the sides. Outsides of limbs like sides, but rather greyer, inner sides white; lower leg and ankles greyish brown all round. Hands and feet brown along the middle of their upper surfaces, their edges white, the contrast especially strongly marked on the feet, where a broad band of deep blackish brown passes along the centre, edged on each side with pure white. Sole-pads large, smooth, and prominent, the last one about three times as long as broad. Fifth hind toe, without claw, reaching to the end of the first phalanx of the fourth. Ears rounded, rather short, laid forward they barely reach to the posterior canthus of the eyes. Tail enormously long, evenly finely haired, the scales, which are large, averaging from seven to nine to the centimetre, uniformly dark brown above and below throughout, but the hairs black for the proximal two thirds above only, elsewhere pure white. Mammæ 2-2=8.

Dimensions of the type, an adult male, preserved as a skin :—

Head and body 280 millim.; tail 340; hind foot 43·5; ear, above

¹ From Saba, the district of North Borneo in which Mount Kina Balu is situated.

head 18, breadth 18; heel to front of last foot-pad 23; length of last foot-pad 7.0.

Skull: tip of nasals to centre of fronto-parietal suture ("bregma") 36 millim.; nasals, length 21, greatest breadth 6.0; interorbital breadth 7.7; outer wall of infraorbital foramen, length 4.7; palate, length 26.5; length of palatal foramen 7.9; diastema 13.6; length of upper molar series 9.4.

Dimensions of a fine female in spirit, preserved in the Museo Civico, Genoa:—Head and body 230; tail 393; hind foot 49; ear 20; heel to front of last foot-pad 25; length of last foot-pad 8.8.

This spirit-specimen was obtained by Signor Beccari at Sungei Bulu, W. Sumatra, thus affording another instance of the relationship between the mountain-faunas of Sumatra and Borneo. Its examination, which I owe to the kindness of my friend the Marquis of Doria, has enabled me to add certain particulars, only observable in spirit-specimens, to the original description of this species.

Mus sabanus belongs to a well-marked group of Rats which contains *Mus jerdoni*, Bly., *M. niveiventer*, Hodgs., *M. coxingi*, Swinh., *M. edwardsi*, Thos., *M. hellwaldi*, Jent., *M. alticola*, Thos., and others. These species are, however, all very much smaller than it is, with one exception, *M. edwardsi*, which is as much larger, and not one of them has a tail of anything like the extraordinary length of that of *Mus sabanus*.

One species, indeed, also a native of Borneo, has a certain superficial resemblance to the present one, although belonging to quite a different group of Rats. This is *M. muelleri*, Jent., of about the same size, and with a nearly equally long tail; but it may be readily distinguished by its coarse *Mus decumanus*-like fur, yellowish instead of rufous coloration, the less sharply defined white underside, and by the quite uniformly brown-haired feet and tail.

16. *MUS LEPTURUS*, Jent.

a. Ad.

b. Imm. 3000 feet. 24/3/88.

Described by Dr. Jentink from Javan examples now in the Leyden Museum.

17. *MUS ALTICOLA*, Thos. Ann. Mag. N. H. (6) ii. p. 408 (1888).

a, b. ♂ ♀. 8600 feet. 24/2/88. ♀. Type.

Fur mixed with flexible spines both above and below. General colour above a peculiar bluish grey, not speckled or grizzled, darker along the median line. Dorsal hairs and spines creamy white basally, gradually darkening to grey terminally. Underside pale yellowish white, the hairs and spines uniformly of this colour to their bases; the line of demarcation on the sides not very sharply defined. Hands and feet white, the hairs short and fine, fifth hind toe (without claw) reaching nearly to the end of the first phalanx of the fourth. Tail finely ringed, the rings averaging about 10 or